THE SEPTEMBER 1977 ERUPTION OF KILAUEA VOLCANO, HAWAI'I[1]

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The latest eruption of Kilauea Volcano began on 13 September 1977, after a 21-month period of quiescence. Harmonic tremor in the central east rift zone and rapid deflation of the summit occurred for 22 hours prior to the outbreak of surface activity.

The first spatter cones formed along a discontinuous, en echelon, 7-km-long fissure system trending N 70°E between two prehistoric vents, Kalalua and Pu'u Kauka. During the first week, eruptive activity was concentrated at two spatter cones, one near the center and one at the west end of the new fissure.

The most voluminous phase of the eruption began late on September 25. An irregular spatter rampart formed along a 500-m segment near the center of the new fissure, but within 24 hours activity became concentrated at the east end of this segment. One flow from the new, breached, 40-m-high cone at this site moved rapidly (up to 300 m/hr) southeast, eventually reaching a point 700 m from the nearest house in the evacuated village of Kalapana. The total volume of material produced during this 19-day eruption is estimated to be 25-50 x 10 m.

Samples from active flows and vents indicate that a differentiated tholeiitic basalt was erupted. Plagioclase is the only significant phenocryst, and augite and minor olivine accompany it as microphenocrysts. This mineralogy, although uncommon in Kilauea lavas, is similar to that of the 1955 basalt. Some variation in bulk composition occurred throughout the eruption, but the last basalt produced also appears to be differentiated, suggesting that the magma involved in summit deflation has not erupted.

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[1] Abstract

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